ASPTEGOPTERYX BUMBUSAE (BUCKTON, 1893) (HEMIPTERA: APHIDOIDEA): NEW TO PAKISTAN! WESTERNMOST RANGE IN ASIA REDEFINED

Muhammad Amin*, Khalid Mahmood and Imran Bodlah*****

* Department of Entomology, Balochistan Agriculture College, 87300 Quetta, PAKISTAN. E-mail: mamin.edupr@gmail.com
** Faculty of Agriculture, Department of Entomology, University of Poonch, 12350 Rawalakot, Azad Jammu and Kashmir, PAKISTAN.
*** Department of Entomology, PMAS-Arid Agriculture University, 46000 Rawalpindi, PAKISTAN.

[Amin, M., Mahmood, K. & Bodlah, I. 2020. *Asptegopteryx bumbusae* (Buckton, 1893) (Hemiptera: Aphidoidea): New to Pakistan! Westernmost range in Asia redefined. Munis Entomology & Zoology, 15 (1): 111-117**]**

ABSTRACT: *Astegopteryx bambusae* (Buckton, 1893) was found on *Bambusa* sp. L. from Abbaspur, Kashmir-Pakistan in December 2015-2016. Diagnostic features, morphometric data, micro-ecology and supportive images of the encountered species are presented. The study also attempts to correct rather anomalous distribution status, in the current aphidological literature, of this species vis-a-vis present day Pakistan in the light of bibliographic, geopolitical and biogeographical perspectives and redefines its westernmost range in South East Asia.

KEY WORDS: *Astegopteryx bambusae*, Abbaspur, Kashmir, Westernmost range, Pakistan

Astegopteryx Karsh, (Aphididae: Hormaphidinae: Cerataphidini) an Oriental genus currently comprises about 24 species, endemic to east and south east Asia, that alternate between primary host *Styrax* species (Ericales: Styracaceae) and secondary host *Bambu* spp. (Poaceae) or Palms (Arecaceae) while inducing gall on the former host (Blackman & Eastop, 2008). Unlike most cerataphidines that invariably are host alternate, *A. bambusae* reproducing anholocyclically, may entirely live on secondary host, *Bambusa* sp. (Stern & Kurosu, 1997; Chakrabarti & Debnath, 2011). Cerataphidines are diagnosed by frontal horns and segmentally arranged wax glands (Chakrabarti & Debnath, 2011). *Astegopteryx bambusae* (Buckton) though documented as endemic species in the sub-continent, east and South East Asia as the pest of *Bambusa* spp. (Fukatsu & Ishikawa, 1996; Edirisinghe & Wijerathna, 2006; Idechiil et al., 2007; TG & Remadevi, 2011) has rather dubious distribution record for Pakistan. None of the main citatationers (Doncaster, 1969; Blackman and Eastop, 1984; Naumann-Etienne & Remaudiere, 1995) referring distribution of *A. bambusae* in Pakistan has mentioned direct encounter with this species in Pakistan. We report direct collection and identification of *A. bambusae* (Buckton) from Abbaspur Azad Jammu and Kashmir-Pakistan. The paper includes morphological and morphometric analysis of the collected species and comparison with Indian specimen along with in situ snapshots of colonies on host plant, micrographs of preserved specimen, ecology and evaluate its ambiguous distribution record related to present Pakistan in the background of bibliographic, geopolitical and biogeographical facts and redefines distribution status of *A. bambusae* vis-a-vis Pakistan and its extreme westward range in Asia.

MATERIAL AND METHODS

Colonies of apterous viviparous females and nymphs along with attendant ants were found on the underside of leaf blades of *Bambusa arundinacea* Willd (Figs. 1a and 1b) in Abbaspur (33°48'52.092" N, 73° 58' 32.3652" E; alt., 1161 m above sea level) a south eastern town in Kashmir-Pakistan, on 12-XII-2015. Several specimens were transferred into screw-lidded plastic vial (10 mm^3) containing 70% ethanol. The collected material was brought to the Entomology Lab., University of Poonch Rawalakot, Kashmir-Pakistan. The diagnostic characters of specimens were examined under Olympus binocular at 40-100X magnification Measurements of diagnostic characters were taken by ocular-micrometer. Specimens were identified following Blackman & Eastop (1994, 2012), Remaudière & Remaudière (1997), Chakrabarti & Debnath (2011) and Favret (2019). Field images (1a and 1b) were shot by Canon 1X US 160 camera. The figures (2a, 2b) were prepared by Nikon Digital Trinocular SMZ 1500. The voucher specimens were deposited in the Department of Entomology University of Poonch, Rawalakot.

RESULTS AND DISCUSSION

1893 *Oregma bambusae* Buckton, G. B. Indian Mus. Notes, 3: 87.
1917 *Oregma lutescens* van der Goot, P., Contr. Faune Indes Need, 13: 197.
1966 *Astegopteryx bambusae*, Doncaster, J.P., Entomologist, 99: 157.

Diagnostic characters

Live adult female aptea (Figs. 2a, 2b) yellowish green or pale green, small sized and broadly pear shaped. Head and pronotum fused forming cephalothorax that has few scantly arranged hairs; Frons medially protruded and bears two forwardly directed horns below antennal tubercles; frontal horns are broad-based, gradually tapering terminally, translucently pale and each having characteristic dark rather rounded apex; about 0.20 × less than the combined length of antennal segment I and II. Antennal tubercles moderately developed, below frontal protuberance; antennae 5 segmented, small about 0.18 × of body length, translucently pale; antennal segments II, III, IV pale; segment III and IV bear 2-4 sparsely distributed, long fine hairs; hairs on antennal segment III approximately equal to the basal width of the segment; Terminal process (PT) shorter than base of segment V, about 0.37 × the base of segment V. Eyes small, black, having 3 facets, without triommatidea, broadly spaced and rather backwardly placed. Rostrum reaching mid coxae with ultimate rostral segment (RIV+V) approximately 0.45 × the segment II of hind tarsi, and bears 4-6 secondary hairs. Legs pale, femora slightly brownish, tibia pale, tarsi slightly brownish distally, pretarsi dark. Marginal wax gland pores plates larger and longitudinally arranged on segments, rounded touching each other over much less than their basal diameter. Siphunculi very small, pale placed on dark sclerotic cones surrounded by 8-10 long hairs. Dorsal transverse diffused streaks of green color present between abdominal tergum I and the siphuncular cones. Dorsum with rows of transversely arranged small hairs. Cauda dark, broad, knob-shaped and bears 6-10 long hairs.

Taxonomic remarks

Diagnostic features of our specimen comply with the diagnostic characters given by Blackman & Eastop (1984) and Ghosh (1988) for *A. bambusae*

(Buckton). Comparison of our specimen with published description of the species by Ghosh (1988) was also found compatible except following minor variations that may be attributed to the differences in geographical conditions of the two localities.

1. Our live specimens had light green color (Figs. 1a and 1b) which turned yellowish brown in the preserved specimens (Figs. 2a and 2b) while Ghosh (1988) described it as light brown.

2. Minor morphometric differences were also observed in our specimen and that of Ghosh (1988).

Ecological remarks

Colonies (Figs. 1a and 1b) of light green to yellowish green and broadly pear shaped aphids were observed on the underside of leaf blades of *Bambusa sp*. plansts in Abbaspur, Kashmir-Pakistan. Upper side of infested leaves were covered with oily exude. The infested leaf blades bore pale look and had dry streaks inside and on margins with dry lumpy patches that extended from center to the leaf margins or vice versa. The leaf blades had turned texturally brittle. Ant attendance was observed (Fig. 1b). Aphids, adult and nymphs fed gregariously and actively ran up and down the leaf-blades.

Status of *A. bambusae* in Pakistani aphid-fauna and its westernmost range in Asia

A. bambusae (Buckton), although reported from Uttar Pradesh India as early as 1893 by Buckton as *Oregma bambusae* on *Bambusa arundinacea* L., however, has ambiguous occurrence record pertaining to present day Pakistan. Doncaster (1966) is the main source of reference about the presence of *A. bambusae* in the latter country. Blackman & Eastop (1984) cite Donscaster (1966) for this aphid in Pakistan. Even Naumann-Etienne & Remaudiere (1995) who reported some 300 species including 180 new records for Pakistan, did not mention direct encounter with this species during their countrywide survey and relied on citing Blackman & Eastop (1984) for this species in Pakistan. Incidentally, the original source, Doncaster (1966) too relies, as suggested by the title of his paper, on the work of Buckton (1893). The locally conducted faunal works on Aphididae (Das, 1918; Hill Ris Lambers, 1966; Shah, 1988; Nasir and yousaf, 1992; Irshad, 2001; Hassan et al, 2010; Bodlah et al., 2011) preceding and following Naumann-Etienne & Remaudiere (1995) also have not mentioned direct collection/encounter of this species in Pakistan. In 1966, present Pakistan used to be the West Pakistan while today's Bangladesh at that point of time was East Pakistan. Based on this geopolitical perspective, it could be concluded that, three main references viz., Doncaster (1966), Blackman & Eastop (1984) and Naumann-Etienne & Remaudiere (1995), represent record of this species for Bangladesh. *Astegopteryx bambusae* is distributed in north east and North West India (Ghosh, 1988; Chakrabarti, 2011) (Fig. 3). Northwardly, Bangladesh is in the vicinity of Meghalaya (North East India) where this species has been reported (Ghosh, 1978; Chakrabarti & Debnath, 2011). Abbaspur Azad Jammu and Kashmir-Pakistan, is geographically oriented further westward to North West India, Himachal Pradesh and Uttar Pradesh, Buckton's original collection was from latter. On this account, three main references, Doncaster (1966), Blackman & Eastop (1984) and Naumann-Etienne & Remaudiere (1995) regarding occurrence of *A. bambusae* in present Pakistan could be regarded as incorrect and the species could be considered as a new record to Pakistani aphid-fauna with Abbaspur Azad Jammu

and Kashmir-Pakistan being the westernmost range for this oriental species in Asia.

CONCLUSION

This paper presents first record, along with morphological and morphometric data, of *A. bambusae* (Buckton) from Abbaspur, Azad Jammu and Kashmir-Pakistan. The study has highlighted rather dubious bibliographic record, as found in the related literature, of *A. bambusae* (Buckton) vis-a-vis present day Pakistan and has redefined status of this species, for Pakistan and its western most range in South East Asia, on the basis of bibliographic, biogeographic and geopolitical record.

LITERATURE CITED

Aoki, S. & Kurosu, U. 2010. A review of the biology of Cerataphidini (Hemiptera, Aphididae, Hormaphidinae), focusing mainly on their life cycles, gall formation, and soldiers. Psyche: A Journal of Entomology, 2010.

Blackman, R. L. & Eastop, V. F. 1994. Aphids on the World's Trees an Identification and Information Guide. CAB International Wallingford, United Kingdom.

Blackman, R. L. & Eastop, V. F. 2012. Aphids on the world's plants: an online identification and information guide. Available at http://www.aphidsonworldsplants.info.

Chakrabarti, S. & Debnath, M. 2011. Hormaphidine aphids (Hemiptera: Aphididae) from northwest Himalaya with description of two new species. Oriental Insects, 45 (1): 49-71.

Chen, J. & Qiao, G. 2012. Wax gland plates in Hormaphidinae (Hemiptera: Aphididae): morphological diversity and evolution. Entomological News, 122 (1): 27-46.

Doncaster, J. P. 1966. Notes on some Indian aphids described by GB Buckton. The Entomologist, 99: 157-160.

Edirisinghe, J. P. & Wijerathna, M. A. P. 2006. Current Status of Aphid Taxonomy in Sri Lanka. Fauna of Sri Lanka: Status of, 35.

Favret, C. 2018. Aphid Species File. Version 5.0/5.0. [18.05.2019]. http://Aphid. Species File.org.

Fukatsu, T. & Ishikawa, H. 1996. Phylogenetic position of yeast-like symbiont of Hamiltonaphis styraci (Homoptera, Aphididae) based on 18S rDNA sequence. Insect biochemistry and molecular biology, 26 (4): 383-388.

Ghosh, A. K. 1978. One new and some rare species of aphids (Homoptera: Aphididae) from Northeast India. Oriental Insects, 12 (1): 97-102.

Idechiil, O., Miller, R. H., Pike, K. S. & Hansen, L. D. 2007. Aphids (Hemiptera: Aphididae), ants (Hymenoptera: Formicidae) and associated flora of Palau with comparisons to other Pacific Islands. Micronesica, 39 (2): 141-170.

Naumann-Etienne, K. & Remaudière, G. 1995. A commented preliminary checklist of the aphids (Homoptera: Aphididae) of Pakistan and their host plants. Parasitica, 51 (1).

Remaudière, G. & Remaudière, M. 1997. Catalogue des Aphididae du monde (Homoptera Aphidoidea): Catalogue of the world's Aphididae. Editions Quae.

Stern, D., Aoki, S. & Kurosu, S. 1997. Determining aphid taxonomic affinities and life cycles with molecular data: a case study of the tribe Cerataphidini (Hormaphididae: Aphidoidea: Hemiptera). Systematic Entomology, 22 (1): 81-96.

TG, R. & Remadevi, O. K. 2011. Aphids as major pests of Bamboos in nurseries of South India and association of potential biocontrol agents. Bamboo Science & Culture, 24 (1).

Table 1. Measurements (in mm) of adult viviparous female aptera, n=4.

Body size		FH	Antennal segments			SIPH	Cauda	
L	W	L	III	IV	V (B+PT)	L	L	W
1.57±0.46^{MS}	0.8±0.04	0.09±0.01	0.2±0.2	0.23±0.29	0.02±0.25	0.04±0.01	0.05±0.001	0.10±0.02
1.31	0.71	0.07	0.67	0.67	0.59+0.02	0.04	0.04	0.08
1.35	0.75	0.08	0.07	0.07	0.06+0.02	0.04	0.04	0.08
1.37	0.78	0.09	0.09	0.08	0.07+0.026	0.04	0.05	0.10
2.27	0.81	0.10	0.10	0.10	0.07+0.026	0.05	0.06	0.13

Abbreviations: B base; FH frontal horns; L length; MS Mean ± Standard Deviation; PT processes terminalis; SIPH siphunculi; w width; III-V antennal segments 3-5.

(a)

(b)

Figure 1. (a). *Astegopteryx bambusae* (Buckton) colony on ventral side of leaf-blade *Bambus arundinacea* Willed, (b). Formicid associated with *A. bambusae* on *B. arundinacea*.

(a)

(b)

Figure 2. (a). Apterous vivipara (dorsal view). Siphuncular cones visible at posterior broader margins, (b). Frontal horns with rounded apices.

Figure 3. Distribution of *A. bambusae* in the North-East to North-West of Subcontinent.